European research and innovation on EuroHPC systems

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Programme Officer at EuroHPC JU

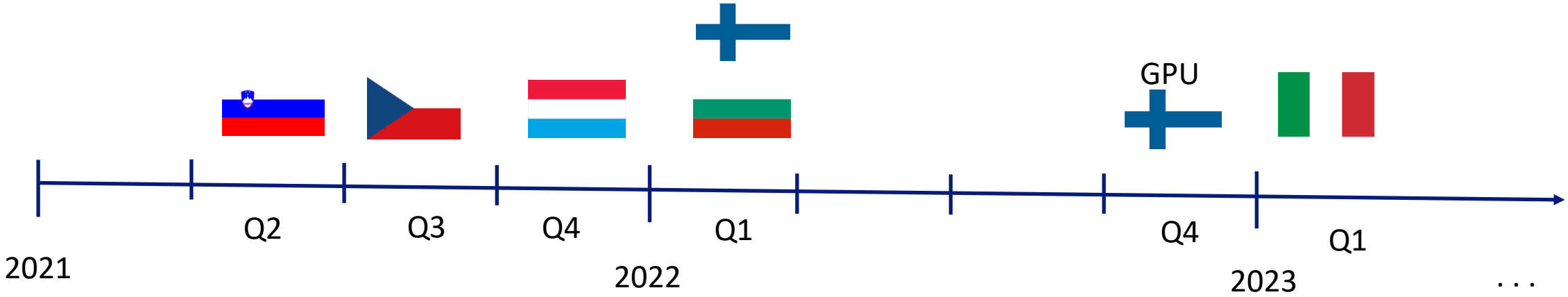
EuroHPC
Joint Undertaking

Why do We Need Supercomputers?

Image by master1305 on Freepik

USERS: Innovation and Evolution through Collaboration!

Systems in production: The timeline



The first EuroHPC JU access projects started 1st of June 2021 and the second applicant was the Swedish SME **NorthVolt** (now a large company).

1,5 years of EuroHPC JU systems usage

- As of 31 December 2022 there were **394** projects of these **~11% (private and public administration sector)**
- **20** SMEs (7 through Regular access calls)
- **21** governmental organisations (3 through the Regular access calls)
- SMEs are from Sweden, Spain, Slovenia, Turkey, Italy, France, Finland, Croatia and Belgium.

Image by vectorjuice on Freepik

Why does Industry Need Supercomputers?

1. Innovation
2. Cost saving
3. Competitive market
4. Profit

HPC can reduce product design and production cycles, accelerate the design of new materials, minimise development and manufacturing costs, and increase resource efficiency.

Types of access

EuroHPC JU Extreme Access

For getting a large amount of compute time (12 to 24 month access)

EuroHPC JU Regular Access

For getting a large amount of compute time (12 month access)

EuroHPC JU Development Access

For developing your solution or software (6-12 month access)

EuroHPC JU Benchmark Access

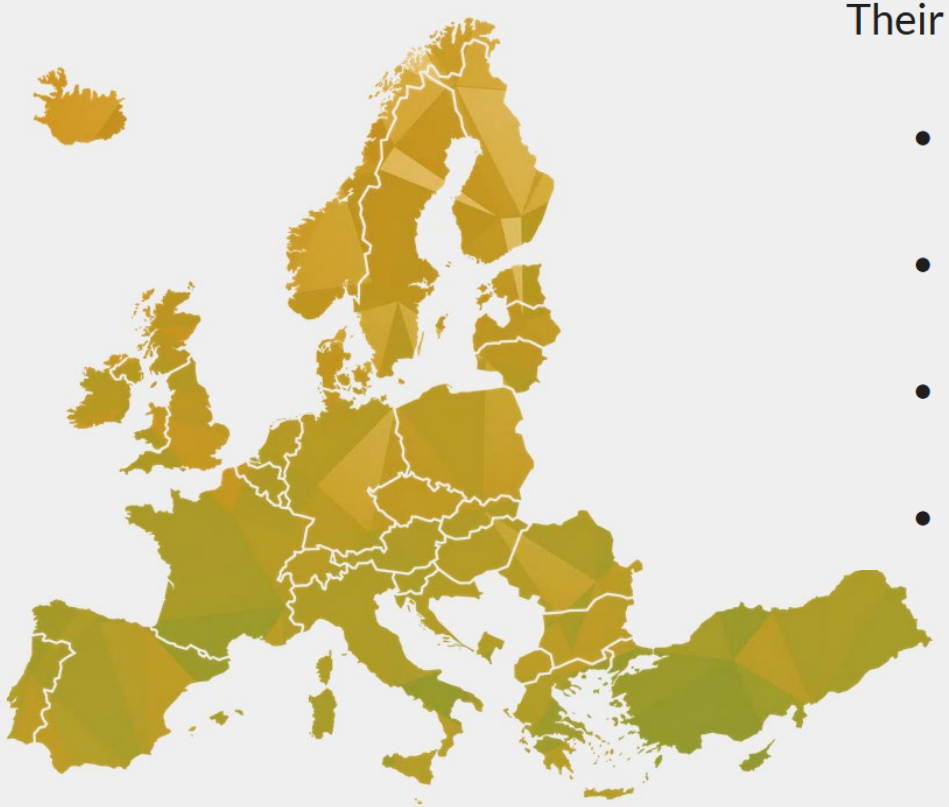
For benchmarking and small tests (3-month access)

Application portal https://pracecalls.eu/

*NOTE: Extreme Access calls target flagship applications that scale to thousands of CPUs and GPUs

Film produced by ENCCS

NCCs are you help centre!



The National Competence Centres (NCCs) are the **central points of contact** for HPC and related technologies in their country.

Their missions are to:

- Develop and display a comprehensive and transparent map of **HPC competences and institutions** in their country
- Act as a **gateway for industry and academia** to providers with suitable expertise or relevant projects, may that be national or international
- Collect **HPC training offers** in their country and display them on a central place together with international training offers collected by other NCCs
- Foster the **industrial uptake of HPC**

https://www.eurocc-access.eu/about-us/meet-the-nccs/

Training

[Training – EuroCC ACCESS (eurocc-access.eu)]

Event feed: Download Copy URL

Search events: Type text to search for

Difficulty Level | Language of Instruction | Country | Audience | Format | Scientific Domain | Technical Domain

All items per page

Hybrid Apr 12 - Apr 13 2023

AI Training Series - Orientation Session

Germany

This two-day "Orientation Session" is the kick-off event of the "LRZ AI Training Series", a series of courses aiming at the needs and...

► Click here for more details

Event website

Google Outlook

Online Apr 17 - May 14 2023

Supercomputing-Akademie: Datenmanagement

Germany

Das Modul _Datenmanagement_ enthält eine Einführung in das Thema Daten und macht Sie mit den Grundlagen vertraut. Das Team von Dr....

► Click here for more details

Event website

Google Outlook

Germany Apr 17 - Apr 19 2023

GPU Programming Part 1: Foundations

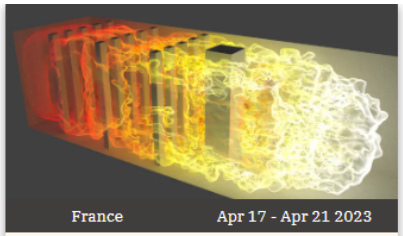
Germany

GPU-accelerated computing drives current scientific research. Writing fast numeric algorithms for GPUs offers high application...

► Click here for more details

Event website

Google Outlook



France Apr 17 - Apr 21 2023

Numerical methods for Large Eddy Simulation

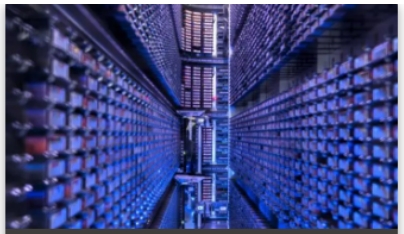
France

The [AVBP] (https://services.excellerat.eu/viewcode/5) code is a parallel code of fluid mechanics that solves compressible...

► Click here for more details

Event website

Google Outlook



Online Apr 17 - Apr 18 2023

EuroCC2 AI for Science Bootcamp

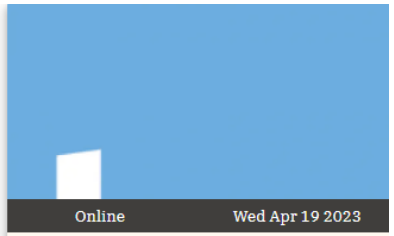
Germany

During this online bootcamp, participants will learn how to apply AI tools, techniques, and algorithms to real-life problems....

► Click here for more details

Event website

Google Outlook



Online Wed Apr 19 2023

Introduction to LRZ HPC Systems with Focus on CFD Workflows

Germany

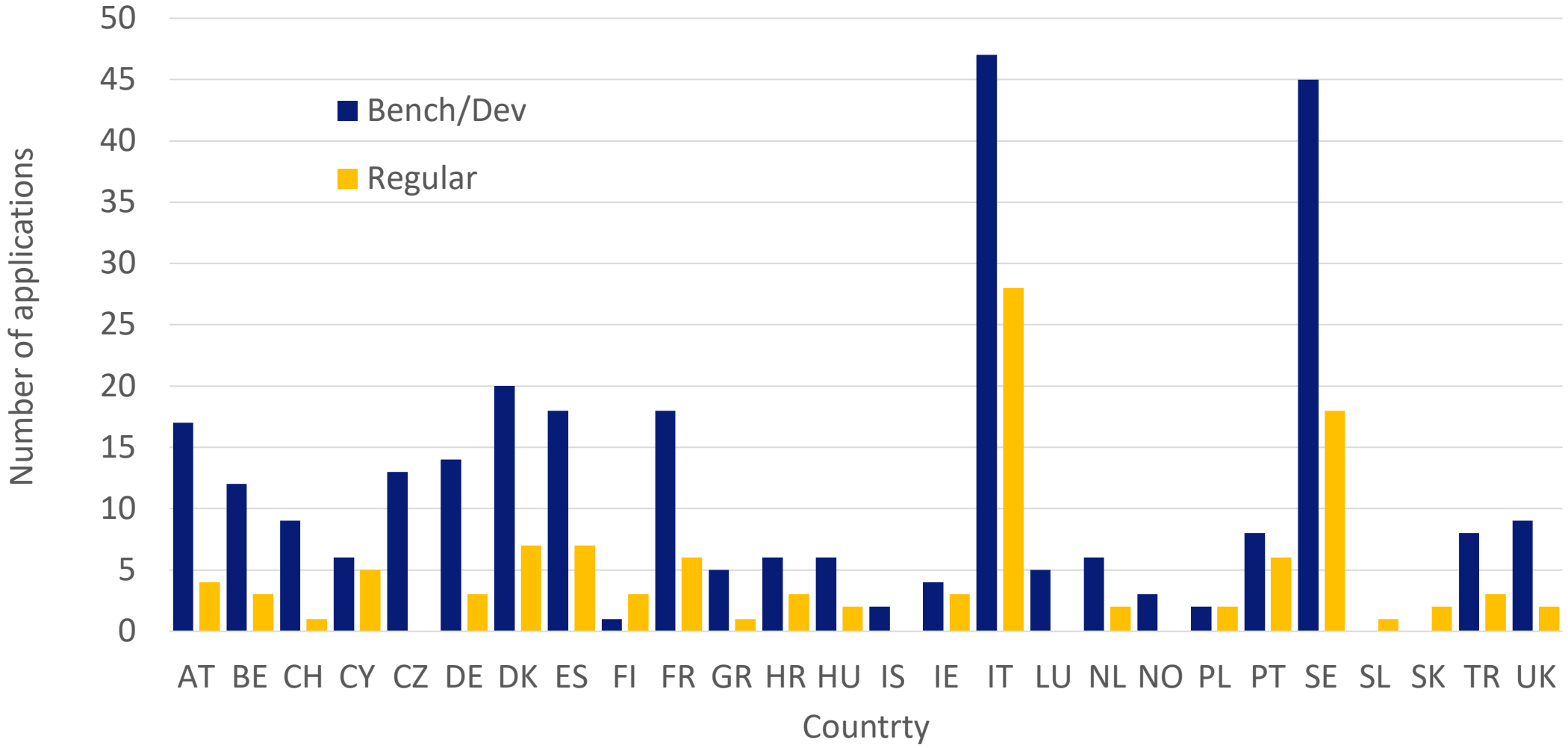
The focus of this short course is to provide to beginners in High Performance Computing (HPC) and Computational Fluid Dynamics (CFD)...

► Click here for more details

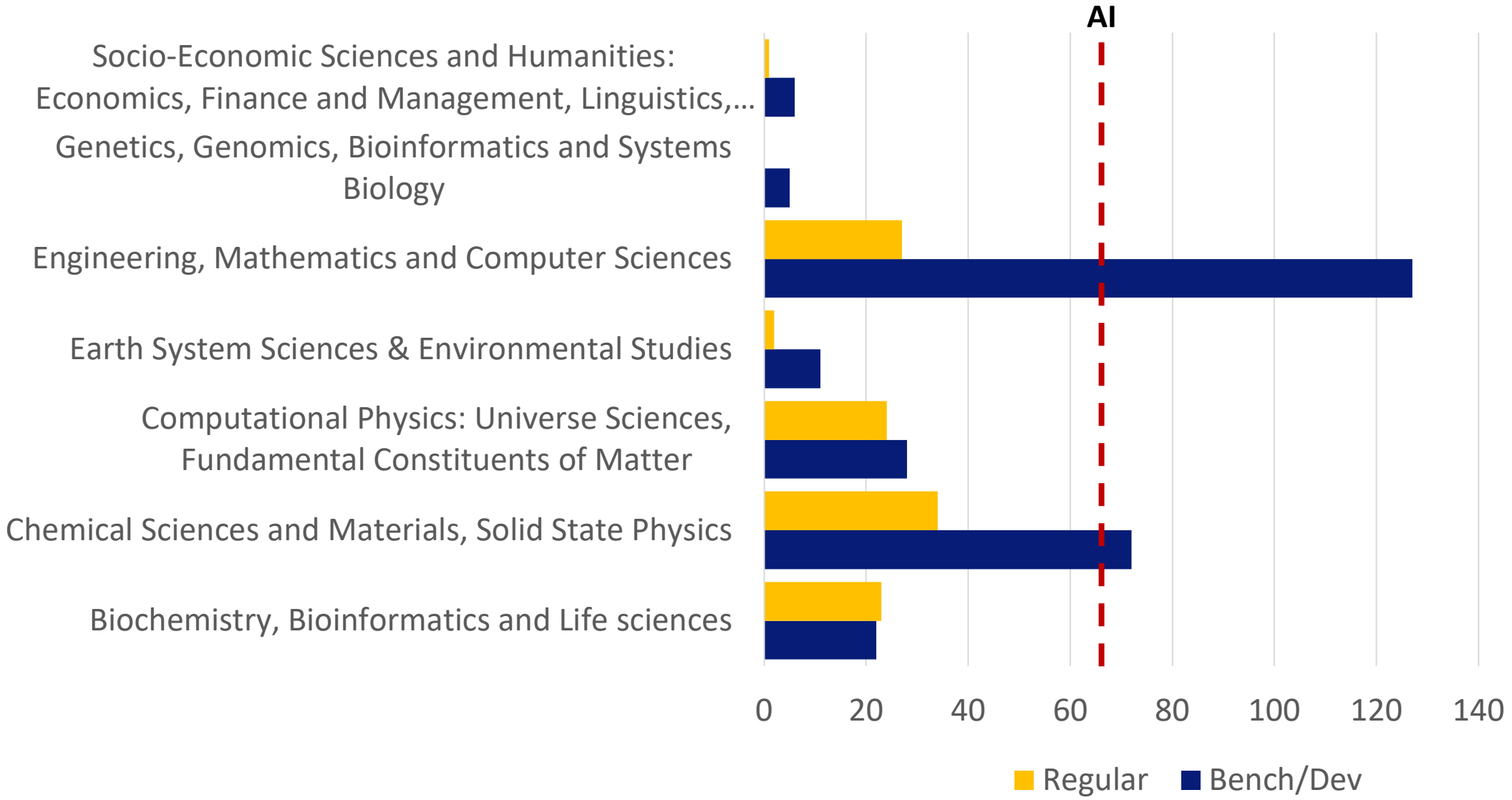
Event website

Google Outlook

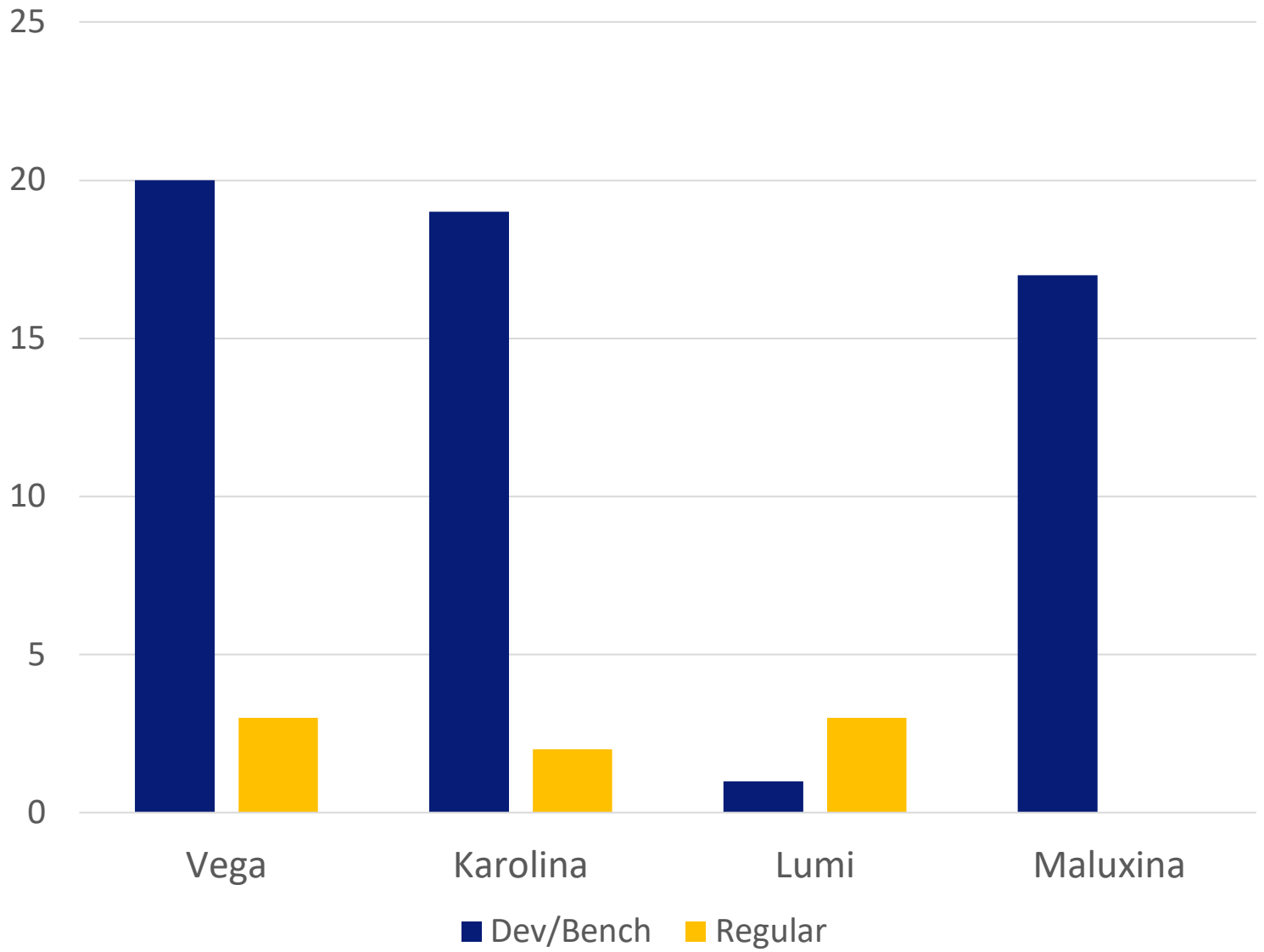
Number of Applications per Country by December 2022



Number of Applications per Discipline by December 2022



AI Applications per System by December 2022



Using EuroHPC Vega System by the Swedish National Archives

Vega for training and inference

- Training the SATRN-model on Vega enabled us to increase the scale of the resized images going into the model, thereby improving accuracy for handwritten text, which generally requires more information than printed text
- Running 9 million images thorugh the pipeline on VEGA took roughly 90 node-hours
- At a hit-rate of 90% this project saves us about 700000 euros in manual labor costs, and the indexing database gets created a lot quicker

Riksarkivet

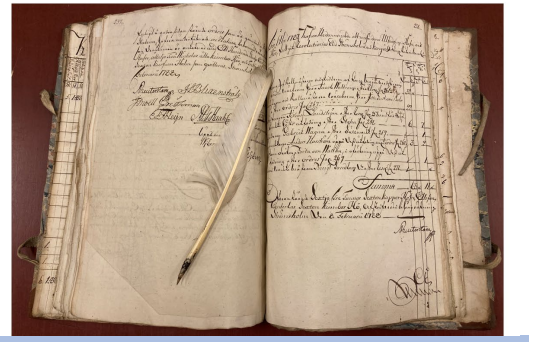
Adapting AI-technology for use in archives

- Image segmentation models
- Text-recognition

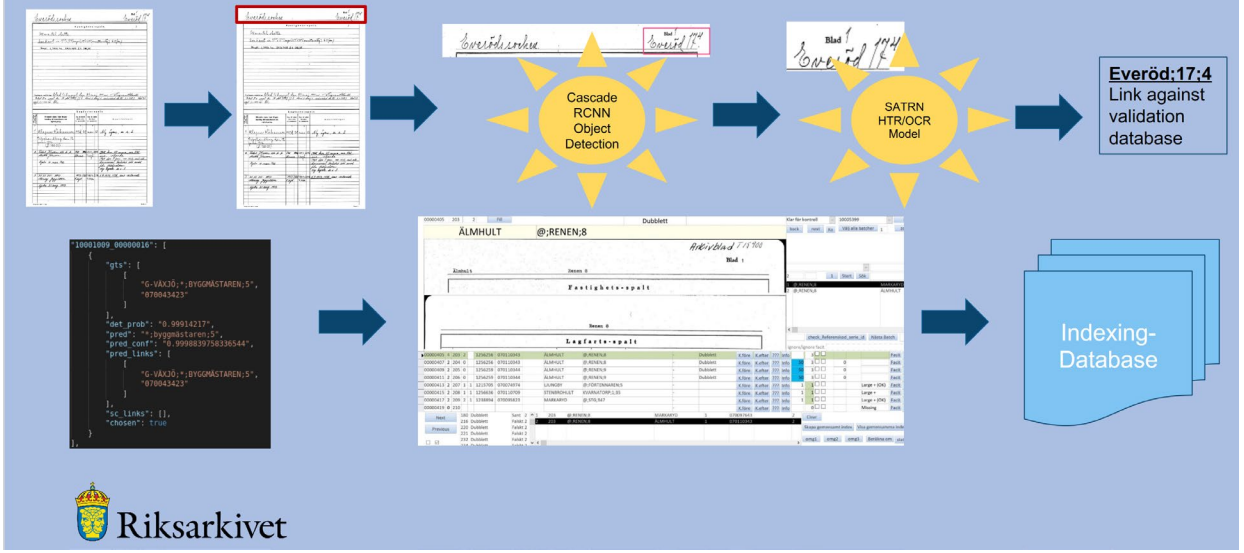
Make scanned images searchable

384 000 GPU core hours
(Development Access, VEGA)

Riksarkivet



The Property Record Indexing Pipeline



Riksarkivet

Using EuroHPC JU Vega System by the Croatian SME Called TIS

System for Early Neurological Deviation Detection

A unique **AI** solution for assessing the quality of spontaneous movements (fidgeting).

The target:

Children in early infancy (2-3m)

The purpose:

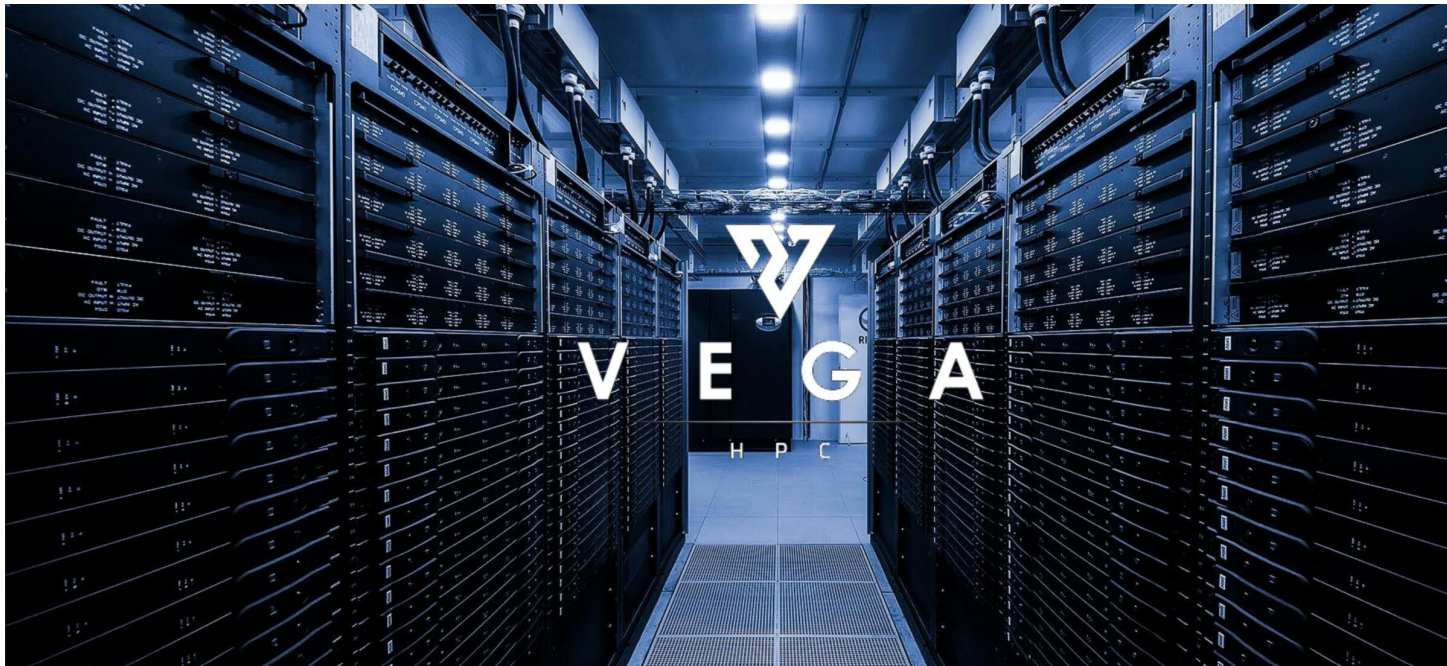
Detecting infants at high risk of neurodevelopmental disorders or expected normal outcome in a group of neuro risky children

Goal: AI system automatically detects neurological risk infants

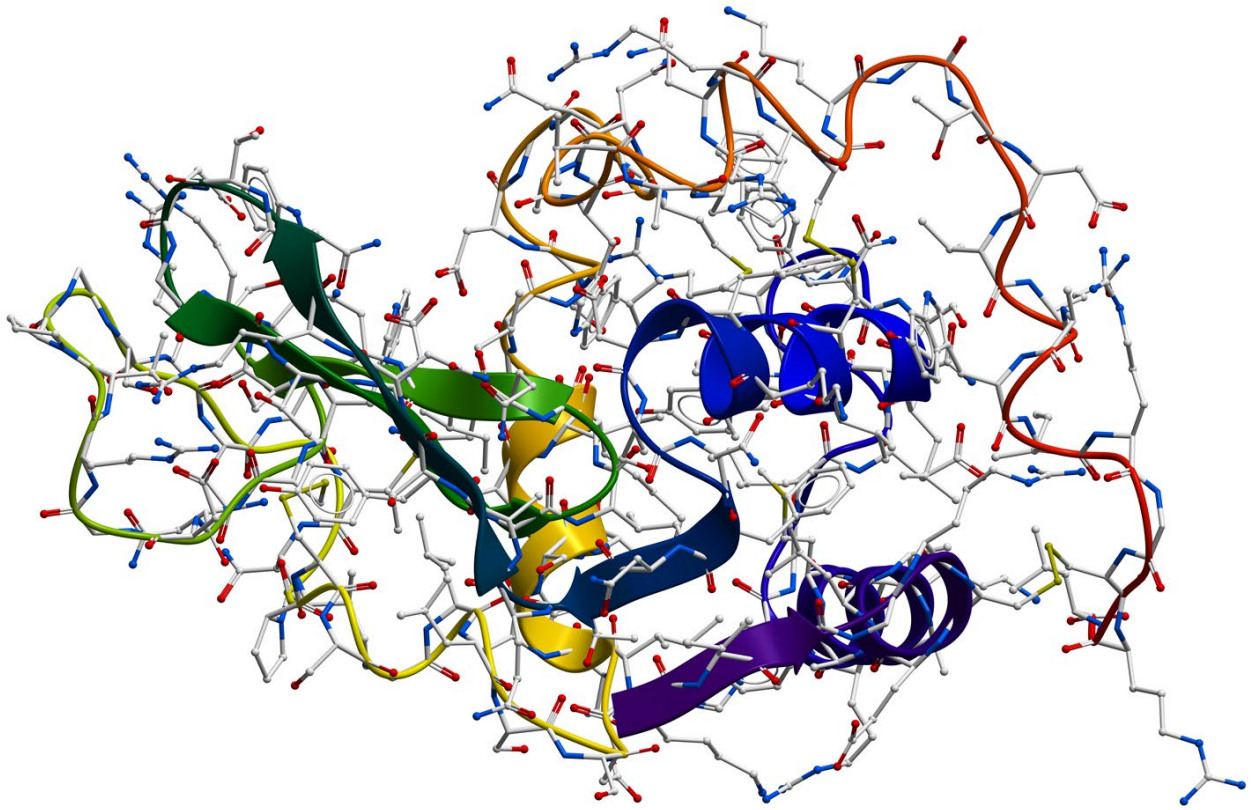
Europska unija
Zajedno do fondova EU
Operativni program KONKURENTNOST I KOHEZIJA
EUROPSKI STRUKTURNI I INVESTICIJSKI FONDOVI

Simulations of the electrochemistry relevant for battery development

Use of classical and reactive molecular dynamics and quantum chemical simulations to devise bottom-up design strategies for improved batteries.



ERCO PHARMA



Skin permeability

- Atomistic model of the main barrier in human skin
- Predict drug permeability using molecular dynamics simulations (GROMACS)

1 920 000 CPU Core Hours

384 000 GPU Core hours

Using EuroHPC JU MeluXina System by Researchers at UC Louvain, Belgium

Towards scalable CFD simulations using MeluXina

Thomas Gillis, Pierre Balty, Philippe Chatelain

> goal

Understand and explore fluid phenomena at **unprecedented level of accuracy**

- Development of a 3D simulation codebase for incompressible flows on **massively distributed systems**
- **Combine advanced MPI with applied mathematics** to deliver production-ready software

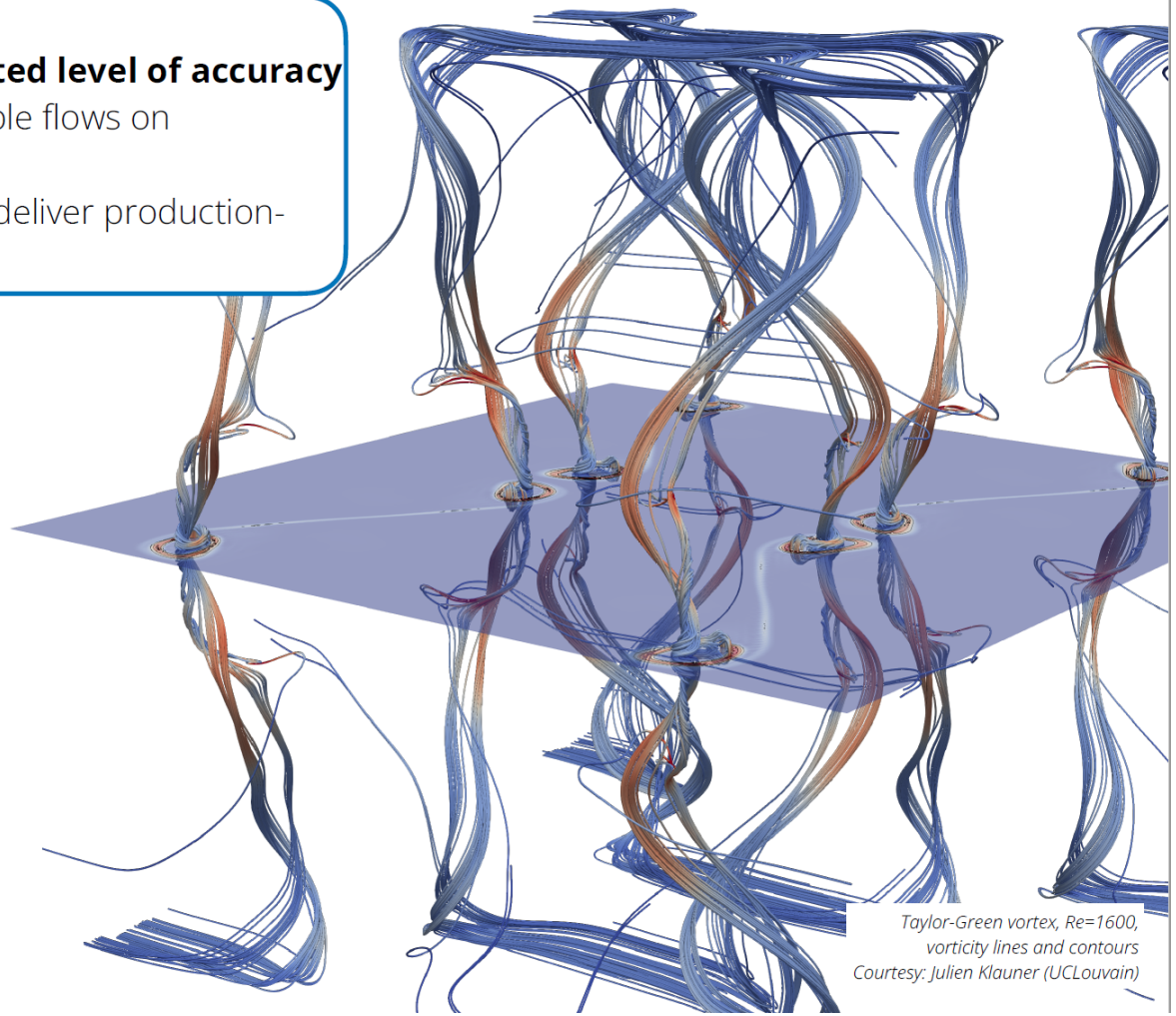
> flups

- Fourier-based Library of Unbounded Poisson Solvers
- User-friendly, scalable, and fast

> murphy

- wavelet-based multiresolution simulation framework
- High order FD and compression
- One-sided communications (MPI-3.1)

UCLouvain
Institute of Mechanics,
Materials and Civil Engineering



Taylor-Green vortex, Re=1600, vorticity lines and contours
Courtesy: Julien Klauner (UCLouvain)

Using EuroHPC JU LUMI System For an EU Collaborative Project

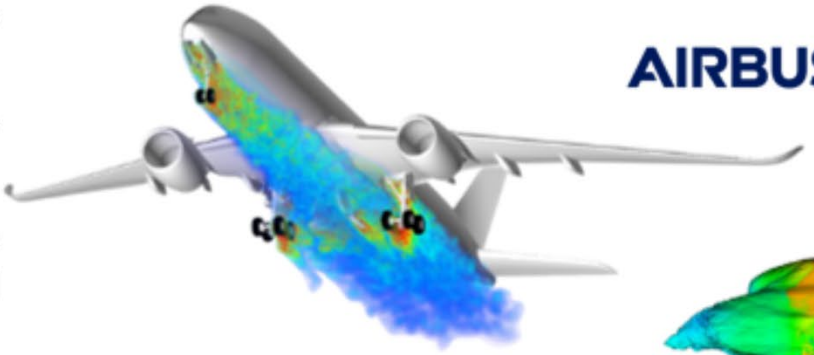
EuroHPC Joint Undertaking

SCALABLE — Lattice-Boltzmann CFD simulation at Exascale

Goals: ProLB ⊠ waLBerla

- Assessment of top industrial (LaBS/ProLB) and academic (waLBerla) solver differences and understanding of key drivers for optimal performance, while preserving industrial needs as "best solution" industrial solver
- Performance, scalability, and energy efficiency optimizations
- Code generation for LBM addressing runtime specifics to enable greater versatility and performance for next generations of HPC hardware
- Usability and operability increase of highly scalable HPC systems for industrial applications

ES GROUP · CERFACS · FAU Friedrich-Alexander Universität Erlangen-Nürnberg · Jülich Forschungszentrum · VSB Technical University of Ostrava · IT4Innovations National Supercomputing Center · Airbus · Groupe Renault · Neovia Innovation



scalable-hpc.eu

@scalable_hpc

company/scalable-hpc

Top500 #85, #12, and #3*

Project start: 01/01/2021
Project end: 31/12/2023

*Source: Nov. 2022 Top500 List

EuroHPC
Joint Undertaking

Thank you!

Questions?